Amendments to the Claims

The listing of claims will replace the previous version, and the listing of claims:

Listing of Claims

1. (Currently amended A fluorescent substance comprising a crystal of nitride or oxy-nitride having a β-type Si_3N_4 crystal structure having ~~Eu~~ Eu^{+2} solid-dissolved into it and emitting a fluorescent light having a peak within a range of 500nm to 600nm in wavelength by being irradiated with an excitation source.

2. (Original) A fluorescent substance according to claim 1, wherein said crystal having a β-type Si_3N_4 crystal structure comprises a β-type sialon ($Si_{6-z}Al_zO_zN_{8-z}$, where $0 \leqq z \leqq 4.2$).

3. (Currently amended) A fluorescent substance according to claim 2, wherein the value of said z is [["]]$0 \leqq z \leqq 0.5$[["]].

4. (Currently amended) A fluorescent substance according to claim 1, wherein in case of representing Eu, A (where A is one, two or more kinds of elements selected from C, Si, Ge, Sn, B, Al, Ga and In) and X (where X is one or two kinds of elements selected from O and N) which are contained in said nitride or oxy-nitride crystal with a composition formula $Eu_aA_bX_c$ (where $a + b + c = 1$), a, b and c in this formula meet the following relations (i) to (iii):

$$0.00001 \leqq a \leqq 0.1 \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \text{(i)}$$

$$0.38 \leqq b \leqq 0.46 \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \text{(ii)}$$

$$0.54 \leqq c \leqq 0.62 \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \text{(iii)}$$

5. (Currently amended) A fluorescent substance according to claim 1, wherein in case of representing said nitride or oxy-nitride

crystal with a composition formula $Eu_aSi_{b1}Al_{b2}O_{c1}N_{c2}$ (where $a + b_1 + b_2 + c_1 + c_2 = 1$), a, b_1, b_2, c_1 and c_2 in this formula meet the following relations (i) to (v):

$$0.00001 \leqq a \leqq 0.1 \cdots\cdots (i)$$

$$0.28 \leqq b_1 \leqq 0.46 \cdots\cdots (ii)$$

$$0.001 \leqq b_2 \leqq 0.3 \cdots\cdots (iii)$$

$$0.001 \leqq c_1 \leqq 0.3 \cdots\cdots (iv)$$

$$0.4 \leqq c_2 \leqq 0.62 \cdots\cdots (v)$$

6. (Currently amended) A fluorescent substance according to claim 5, wherein in said composition formula $Eu_aSi_{b1}Al_{b2}O_{c1}N_{c2}$, the relation between b_1 and b_2 and the relation between c_1 and c_2 respectively meet the following relations:

$$0.41 \leqq b_1 + b_2 \leqq 0.44, \text{ and}$$

$$0.56 \leqq c_1 + c_2 \leqq 0.59.$$

7. (Previously presented) A fluorescent substance according to claim 1, wherein said excitation source is an ultraviolet light or a visible light of 100nm to 500nm in wavelength.

8. (Previously presented A fluorescent substance according to claim 7, wherein said excitation source is a violet light or a blue light of 400nm to 500nm in wavelength.

9. (Previously presented) A fluorescent substance according to claim 1, wherein said excitation source is an electron beam or an X ray.

10. (Previously presented) A fluorescent substance according to claim 1, wherein said peak is within a range of 500nm to 550nm in wavelength.

11. (Currently amended) A fluorescent substance according to claim 1, wherein x and y of ~~the~~ a value (x, y) on ~~the~~ a CIE chromaticity coordinates of ~~the~~ a color of light emitted at ~~the~~ a time of being irradiated with said excitation source meet the following relations (i) and (ii):

$$0 \leqq x \leqq 0.3 \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \text{(i)}$$

$$0.5 \leqq y \leqq 0.83 \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \text{(ii)}$$.

12. (Previously presented) A fluorescent substance according to claim 1, wherein said nitride or oxy-nitride crystal comprises a single crystal of 50nm to 20μm in average grain diameter.

13. (Previously presented A fluorescent substance according to claim 1, wherein said nitride or oxy-nitride crystal is a single crystal of 1.5 to 20 in average aspect ratio.

14. (Currently amended) A fluorescent substance according to claim 1, wherein ~~the~~ a total of impurity elements Fe, Co and Ni contained in said nitride or oxy-nitride crystal is not more than 500ppm.

15. (Currently amended) A fluorescent substance ~~according to claim 1~~ comprising a crystal of nitride or oxy-nitride having a β-type Si_3N_4 crystal structure having Eu^{+2} solid-dissolved into it and emitting a fluorescent light having a peak within a range of 500nm to 600nm in wavelength by being irradiated with an excitation source,

wherein said fluorescent substance further comprises ~~nitride or oxy-nitride crystal is formed as a mixture containing~~ another crystalline or amorphous compound different from said nitride or oxy-nitride crystal and ~~the~~ a quantity of said nitride or oxy-nitride crystal contained in said fluorescent substance ~~mixture~~ is 50 wt% ~~(weight percents)~~ or more.

16. (Original) A fluorescent substance according to claim 15, wherein said another crystalline or amorphous compound is an electrically conductive inorganic compound.

17. (Currently amended)) A fluorescent substance according to claim 16, wherein said electrically conductive inorganic compound is oxide, oxy-nitride, or nitride ~~or a mixture thereof~~ containing ~~one, two or more kinds of elements~~ at least one element selected from Zn, Ga, In and Sn, or mixture thereof.

18. (Currently amended) A fluorescent substance manufacturing method for manufacturing a fluorescent substance according to claim 1, comprising a process of burning a raw material mixture containing metal, oxide, carbonate, nitride, fluoride, chloride or oxy-nitride of Eu, silicon nitride and aluminum nitride at a temperature of 1820℃ to 2200℃ in a nitrogen atmosphere.

19. (Canceled)

20. (Previously presented A fluorescent substance manufacturing method according to claim 18, wherein said nitrogen atmosphere in said process of burning is a nitrogen atmosphere within a pressure range of 0.1MPa to 100MPa.

21. (Currently amended) A fluorescent substance manufacturing method according to claim 18, further comprising a process of obtaining said raw material mixture by filling a container with a metal compound in ~~the~~ a form of powder or aggregate in a state of keeping said mixture at a filling factor of 40% or less in volume density before said process of burning.

22. (Original) A fluorescent substance manufacturing method according to claim 21, wherein said container is made of boron nitride.

23. (Previously presented) A fluorescent substance manufacturing method according to claim 21, wherein said metal compound aggregate is 500μm or less in average grain diameter.

24. (Original) A fluorescent substance manufacturing method according to claim 23, further comprising a process of making said metal compound aggregate be 500μm or less in average grain diameter by means of spray dryer, sieving or wind classification.

25. (Currently amended) A fluorescent substance manufacturing method according to claim 18, wherein said burning ~~means~~ is ~~not a means using a hot press but a means~~ made by using exclusively a normal pressure sintering method or a gas pressure burning method without using a hot press.

26. (Previously presented) A fluorescent substance manufacturing method according to claim 18, further comprising a process of grain-size-adjusting the burnt fluorescent substance so as to be powder of 50nm to 20 μm in average grain diameter by one or plural means selected from grinding, classification and acid treatment.

27. (Currently amended) A fluorescent substance manufacturing method according to claim ~~18~~ 26, further comprising a process of performing a heat treatment on ~~a~~ the fluorescent substance after said burning process or after said grain size adjusting process at a temperature ~~being~~ not lower than 1000℃ and ~~being~~ lower than a burning temperature in said process of burning.

28. (Currently amended) A fluorescent substance manufacturing method ~~according to claim 18~~ for manufacturing a fluorescent substance comprising a crystal of nitride or oxy-nitride having a β-type Si_3N_4 crystal structure having Eu^{+2} solid-dissolved into it and emitting a fluorescent light having a peak within a range of 500nm to 600nm in wavelength by being irradiated with an excitation source,

said method comprising a process of burning a raw material mixture containing metal, oxide, carbonate, nitride, fluoride, chloride or oxy-nitride of Eu, silicon nitride and aluminum nitride at a temperature of 1820℃ to 2200℃ in a nitrogen atmosphere,

wherein said raw material mixture contains an inorganic compound forming a liquid phase at a temperature ~~being~~ not higher than the burning temperature in said process of burning.

29. (Currently amended) A fluorescent substance manufacturing method according to claim 28, wherein said inorganic compound forming ~~a~~ the liquid phase at a temperature ~~being~~ not higher than said burning temperature comprises at least one ~~a mixture of one, two or more kinds~~ of fluoride, chloride, iodide, bromide and phosphate of ~~one, two or more kinds of elements~~ at least one element selected from Li, Na, K, Mg, Ca, Sr and Ba.

30. (Currently amended) A fluorescent substance manufacturing method according to claim 29, wherein said inorganic compound forming ~~a~~ the liquid phase at a temperature ~~being~~ not higher than said burning temperature is calcium fluoride.

31. (Currently amended) A fluorescent substance manufacturing method according to claim 28, wherein said raw material mixture contains ~~an~~ the inorganic compound forming ~~a~~ the liquid phase at a temperature ~~being~~ not higher than said burning temperature at the ratio of 0.1 to 10 in weight of said inorganic compound to 100 in weight of said raw material mixture.

32. (Currently amended) A fluorescent substance manufacturing method according to claim 28, further comprising a process of cleaning said burnt mixture with a solvent so as to reduce ~~the~~ quantity of said inorganic compound forming ~~a~~ the liquid phase at a temperature ~~being~~ not higher than said burning temperature after said burning process.

33. (Currently amended) An illuminator comprising a light emitting light source and a fluorescent substance, wherein said fluorescent substance comprises ~~a~~ the fluorescent substance according to claim 1.

34. (Currently amended) An illuminator according to claim 33, wherein said light emitting light source comprises at least one of a light emitting diode ~~(LED)~~, a laser diode ~~(LD)~~, an inorganic EL device and an organic EL device which emit light of 330 to 500nm in wavelength.

35. (Currently amended) An illuminator according to claim 33, wherein said light emitting light source is a light emitting diode

~~(LED)~~ or a laser diode ~~(LD)~~ which emits light of 330 to 420nm in wavelength, ~~and~~

said fluorescent substance further comprises a blue fluorescent substance having a peak of emitted light within a range of 420nm to 500nm in wavelength, said light being emitted by an exciting light of 330nm to 420nm, and a red fluorescent substance having a peak of emitted light within a range of 600nm to 700nm in wavelength, said light being emitted by an exciting light of 330nm to 420nm, and

said illuminator emits white light by mixing blue light, green light and red light together.

36. (Currently amended) An illuminator according to claim 33, wherein said light emitting light source is a light emitting diode ~~(LED)~~ or a laser diode ~~(LD)~~ which emits light of 420 to 500nm in wavelength,

said fluorescent substance further comprises a red fluorescent substance having a peak of emitted light within a range of 600nm to 700nm in wavelength, said light being emitted by an exciting light of 420 to 500nm, and

said illuminator emits white light by mixing together blue light of said light emitting light source, and green light and red light emitted by said fluorescent substances.

37. (Currently amended) An illuminator according to claim 33, wherein said fluorescent substance further comprises a yellow [[()]or orange[[)]] fluorescent substance having a peak of emitted light within a range of 550nm to 600nm in wavelength, said light being emitted by an exciting light of 300 to 420nm or 420 to 500nm.

38. (Currently amended) An illuminator according to claim 33, wherein said light emitting light source is ~~an LED or an LD~~ a light

emitting diode or a laser diode which emits light of 420 to 500nm in wavelength,

said fluorescent substance further comprises a yellow [[()]or orange[[)]] fluorescent substance having a peak of emitted light within a range of 550nm to 600nm in wavelength, said light being emitted by an exciting light of 420 to 500nm, and

said illuminator emits white light by mixing together blue light of said light emitting light source, and green light and yellow [[()]or orange[[)]] light emitted by said fluorescent substances.

39. (Currently amended) An illuminator according to claim 37, wherein said yellow [[()]or orange[[)]] fluorescent substance is Ca-α sialon having Eu solid-dissolved into it.

40. (Currently amended) An illuminator according to claim 36, wherein said red fluorescent substance comprises a fluorescent substance obtained by solid-dissolving Eu into an inorganic material having a $CaAlSiN_3$ ~~type~~ crystal structure.

41. (Currently amended) An illuminator according to claim 40, wherein said inorganic material having ~~a~~ the $CaAlSiN_3$ ~~type~~ crystal structure is $CaAlSiN_3$.

42. (Currently amended) An image display device comprising an excitation source and a fluorescent substance, wherein said fluorescent substance comprises ~~a~~ the fluorescent substance according to claim 1.

43. (Currently amended) An image display device according to claim 42, comprising at least one of a fluorescent display tube ~~(VFD)~~, a

field emission display ~~(FED)~~, a plasma display panel ~~(PDP)~~ and a cathode ray tube ~~(CRT)~~.